Caratori Tontini, F., Cocchi, L., Carmisciano, C., (**2007**), *Detph-to-the-bottom Optimization for Potential-field Data Inversion*, ***Eos Trans. AGU, 88*(23), Jt. Assem. Suppl., Abstract GP53A-02**

INVITED

We show an algorithm for the linear inversion of 2D surface magnetic data to obtain 3D models of the susceptibility of the source. After showing a novel characterization of the ambiguity domain in the Fourier space, which has a simple geometrical interpretation, we will demonstrate that a depth-weighting function is useful to significantly reduce the ambiguity domain in order to characterize the main source properties. The forward model is discretized by a mesh of prismatic cells with constant magnetization that allows the recovery of a complete 3D generating source. As the number of cells are normally grater than the amount of available data, we are left with an underdetermined linear inverse problem, which can be regularized in order to obtain an unique solution by a depth-weighting function, adapted from Li and Oldenburg (1996) to close the source towards its bottom. The main novelty of this method is a first-stage optimization that gives information about the depth-to-the-bottom (dtb) of the generating source. This parameter permits both the evaluation of the appropriate vertical extension of the mesh, and the definition of the shape of the regularizing depth-weighting distribution. The adopted method is suitable under appropriate changes to deal also with gravity data. After showing which kind of a priori information is introduced by this particular regularization, we will describe its limits and its possible improvements and then we will show the results of some synthetic tests. As a final application we will show the 3D magnetic model of an interesting volcanic region in Italy.